

# StrucTools - Experimental and virtual tools for Structural Mechanics

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The experimental component in structural mechanics courses is instrumental in providing a direct contact with the principal concepts and methods of structural analysis, whereby the theoretical background is combined with the visualization of the physical phenomena. That is why a didactic test frame is used at FEUP (Fig.1), both for practical laboratory assignments and for supporting lecture presentations. In the framework of the **StrucTools Project** voice and video communication facilities were added, using Skype® and an IP network camera, connecting in a very convenient and effective way the lecture theatre to the structural laboratory.

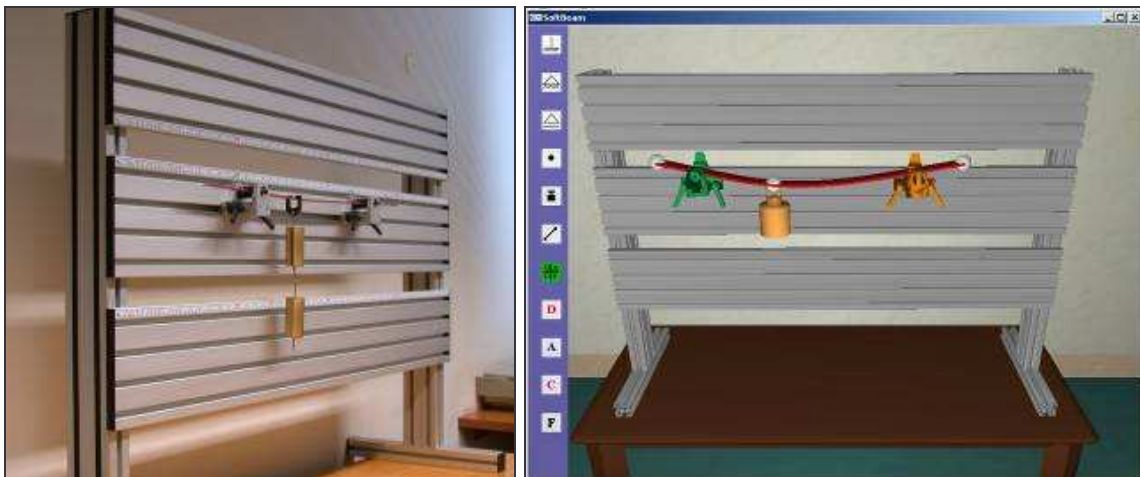


Fig. 1. Didactic structural mechanics experimental setup (left) and virtual tool (right)

In view of the large student target group the **StrucTools Project** aimed to produce a software tool to complement the didactic test frame. The end result is **SoftBeam** [1], a virtual reality application whose primary goal is to provide students with easy access to the main features of the experimental setup in order to facilitate knowledge integration with the perception of demonstrations (“seeing is believing”), to promote “virtual practice” and its feedback, to observe details, to stimulate cooperative activity, to learn sequentially, to synthesize knowledge. **SoftBeam** reproduces the test frame geometry and operation in a very realistic way, with a careful choice of textures and lighting that enhance the sense of presence (Fig.1). **SoftBeam** combines a precise structural analysis module with a friendly user interface developed in OpenGL, featuring zoom, pan and rotation and animation facilities. **SoftBeam** is a teaching/learning tool that successfully circumvents the limitations associated with the availability of the real test frame.

References:

[1] Marques, J.C., Restivo, M.T., Sousa, A.A., Castro, F., Portela, J.P., Silva, C.M. and Delgado, R. (2008), *Structural Mechanics: a didactic experimental set-up and its experimental tool*, Proc. ICETA 2008, Stará Lesná, Eslováquia.